

The diagram illustrates the metabolic pathways of purine nucleotides. It shows the conversion of GMP to AMP and the de novo synthesis of purine. The pathways involve the conversion of Xanthine to Guanosine, Xanthosine, and Theophylline, and the conversion of IMP to AMP. The diagram also shows the conversion of XMP to IMP and the conversion of IMP to AMP. The pathways are labeled with (N-1), (N-3), (N-7), and (N-15) indicating the positions of the nitrogen atoms in the purine ring.

De novo Purine Biosynthesis:

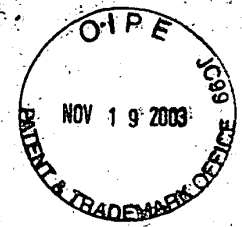
- Glucose → Glucose-6-P → 6-Pyruvate → 6-Carboxy-IMP → IMP → AMP
- Glucose → Glucose-6-P → 6-Pyruvate → 6-Carboxy-IMP → IMP → XMP → IMP → AMP

Interconversion of Purine Nucleotides:

- AMP → IMP → XMP → IMP → AMP
- IMP → XMP → IMP → AMP
- IMP → XMP → IMP → AMP

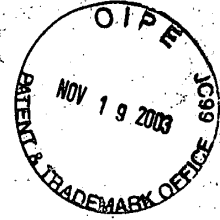
Other Pathways:

- Xanthine → Guanosine → GMP
- Xanthine → Xanthosine → Guanosine → GMP
- Xanthine → Theophylline → Guanosine → GMP
- Xanthine → Theophylline → Guanosine → GMP



GTCCTGCATA TGAATGGAGC TCCAAGAAGT CCTGCATATG AATGGAGGCG AAGCGGAAGC AAGCTACGCC AAGAATTCAT CCTTCAATCA 90
ACTGGTTCTC GCCAAGGTGA AACCTGTCTT TGAACAATGC GTACGGGAAT TGTGCGGGC CAACITGGCC AACATCAACA AGTGCAATTA 180
AGTTGCAGAT TTGGGATGCG CTTCCGGACC AACACACTT TTAACCGTTT GGGACACTGT ACAAGTATT GACAAAGTTA AGCAAGAAAT 270
GAAGATGAA TTAGAAGTC CCACCATTC AAGAAAATGG ACGAAAATA GGTCTTCTG ACTGATCTT TCCAAATGA TTTCATTCG GTTTTCATGC TGCTGCCAAG 360
CTTCTACCGC AACTTGAGA AAGAAATGG ACGAAAATA GGTCTTCTG ACTGATCTT TCCAAATGA TTTCATTCG GTTTTCATGC TGCTGCCAAG 450
CCCCGAGGAG TCCATGCATT TTTTACACTC TTTTACACTC TTTTACACTC TTTTACACTC TTTTACACTC TTTTACACTC TTTTACACTC 540
CACTGCCAAC AAAGGAGCA TTTTACTCTC CAAGCAAGT CCTCCGCCG TCCAGAAGGC ATATTTGGAT CAATTACGA AAGATTTTAC 630
CACATTTTAA AGGATGCGT CGGAAGAGT GCTTTCACGT GCTTTCACGT GCTTTCACGT GCTTTCACGT GCTTTCACGT GCTTTCACGT 720
GAATACCATG GACTTACTTG AGATGGCAAT AAACGACTTG GTTGCTGAGG GACGCTGAGG GACGCTGAGG GACGCTGAGG GACGCTGAGG 810
AATCTATACA GCTTCTCTA TTGATGATGA TTGCAAGTA AGATCCCAT TTGCAAGTA AGATCCCAT TTGCAAGTA AGATCCCAT TTGCAAGTA 900
TTATGATGCT GGCTTCTCTA TTGATGATGA TTGCAAGTA AGATCCCAT TTGCAAGTA AGATCCCAT TTGCAAGTA AGATCCCAT TTGCAAGTA 990
GGCATCATTA ATTAGATCAG TTTACGAACC CATCTAGCA AGTCATTTTG GAGAAGCTAT TATACCTGAC ATATTCCACA GGTTCGCGAC 1080
GAATGCAGCA AAGGTTATCC GCTTGGGCAA AGGCTTCTAT AATAATCTTA TCATTCTCT TGCCAAAAA CCAGAGAAGT CAGACATATA 1170
AAAGCTTGT TTTAGTTGGT TTTTGTGTTA TGGTTGTTT TCTGATACGG GGAAGGATT CAGTGGGTT GGGGTTCTAT CCGAGTATG 1260
TACTTTTAT ATTATTAGT GGTGTATAAT TATTATGTTA CATTTGTTA TCGTAATAA AAGTGACGTA CAAAAATAA ATATTTTAT 1350
AAAAAAAAA 1360

FIG. 2A



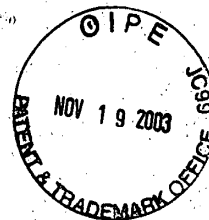
TTTAGCAGTC CCAATTCGAT TTATGTACAA GTCTGTGCATA TGAATGGAGC TCCAAGAAGT CCTGCATATG AATGAGGGCG AAGGCGATGC 90
AAGCTACGCC AAGAATTTCAT CCTTCAATCA ACTGGTTCTC GCAAGGTGA AACCTGTCTT TGAACAATGC GTAGGGGAAT TGTTCGGGC 180
CAACTTGCCC AACATCAACA AGTGCAATTA AGTTGCGGAT TTGGATGCG GTTGGATGCG CTTCCGGACC AACACACATT TTAACAGTTC GGGACATTGT 270
ACAAAGTATT GACAAAGTTA GGCAAGAAAT TTTCTACCGC CCCCAGGAG TCAATGCATT TTTTACACTC ACGCAAGATA GGATCGTGCC TCCAAATGA 360
TTTCAATTG GTTTTCATGT TGCTGCCAAG GCAGACTCTT AATGGGGAT CACTGCGAAC CACATTTTAA AGGATTCTGT TTAGAACGTC CCACCATTC 450
AATGCTGGC TCTTTCCAG GCAGACTCTT AATGGGGAT CACTGCGAAC CACATTTTAA AGGATTCTGT TTAGAACGTC CCACCATTC AAGAAATGG 540
TCCCAGCGGT TTGGTGACTG AATGGGGAT CACTGCGAAC CACATTTTAA AGGATTCTGT TTAGAACGTC CCACCATTC AAGAAATGG ACGCAAGATA 630
ATATTTGGAT CAATTTACGA AAGATTTTAC CACATTTTAA AGGATTCTGT TTAGAACGTC CCACCATTC AAGAAATGG ACGCAAGATA GGATCGTGCC 720
CATTTGCAAA GGAGATGAAT TCGACGGCCC GAATACCATG AATCTATGCA TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT 810
GGAAGAAAAA TTGGACAGTT TCGACGGCCC GAATACCATG AATCTATGCA TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT 900
AATTTTGTAC TTGGACAGTT TCGACGGCCC GAATACCATG AATCTATGCA TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT 990
CAGCGATGAA CATGCTAGAG CAGCGCATGT GGCATCATTA CTTAGATCAG GCTTCTCTA TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT 1080
TATACCTGAC ATATTCACA GGTTCGAC GAATGCAGCA AAGTTATCC CTTAGATCAG GCTTCTCTA TTAGATGCTT TTAGATGCTT TTAGATGCTT 1170
TGCCAAAAA CCAGAGAAGT CAGACATATA AAGCTTGT TATAGTTGGT TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT TTAGATGCTT 1260
TAGTGGGTT GGGTTTCAA AAAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA 1304

FIG. 2B



CTTTGGCAGT CCCAATTGGA TTATGTACA AGTCTGTCAT ATGAATGGAG CTCCAAGAAG TCCTGCGGAT GAATGGAGGC GAAGGCATA 90
CAAGCTACGC CAAGAATTCA GCCTACAATC AACTGGTTCT CGCCAAGGTG AAACCTGTCC TTGAACAATG CGTACGGGAA TTGTTGCGG 180
CCAACTTGGC CAACATCAAC AAGTGCATTA AAGTTGCGGA TTTGGGATGC GCTTCTGGAC CAAACACACT TTTAACAGTT CGGGACATTG 270
TCCAAGTAT TGACAAAGTT GGCCAGGAAA AGAAGAATGA ATTAGAACGT CACCACTTC AGATTTTCT GAATGATCTT TTCCCAAATG 360
ATTTCATTC GGTTCCTACG TTGCTGCCAA GCCTCTACCG CAACTTGAG AAGAAAATG GACGCAAAAT AGGATCGTGC CTAATAGGGG 450
CAATGCCCG CTCTTTCTAC AGCAGACTCT TCCCGAGGA GTCCATGCAT TTTTACACT CTTGTTACTG TCTTCAATGG TTATCTCAGG 540
TTCCTAGCG TTTGGTGACT GAATTGGGGA TCAGTACGAA CAAAGGGAGC ATTTACTCTT CCAAGCAAG TCGTCTGCC GTCCAGAAGG 630
CATATTTGGA TCAATTTACG AAAGATTTTA CCACATTTCT AAGGATTCAT TCGGAAGAGT TGTTTTACA TGGCCGAATG CTCCTTACTT 720
GCATTTGTAA AGGAGTTGAA TTAGACGCC CAGTCTATAT ACCTTCAGCA GAAGAAGTAA AGTGATAGT TGAGGAGGAA GGTCTTTTG 810
AGGAAGAAAA ATTGGATAGT TTCAATCTTC TTTAAGGTCC TTTACGATGC TGGCTTCTCT ATTGACGATG AACATATTAA AGCAGAGTAT GTTGCACTT 900
AAATTTTATA CCTGGAGACT AGTTTACGAA CCCATCCTCG CAAGTCATTT TGGAGAAGCT ATTATACCTG ACATATTCCA CAGGTTTGGC AAGCATGCAG 1080
CAAAGGTTCT CCCCTTGGG AAAGGCTTCT ATAATAATCT TATCATTTCT CTCGCCAAA AGCCAGAGAA GTCAGACGTG TAAAGTTTG 1170
TTTTTGTTT GGGGAAAGGA ATAAGTGCCG TTGGGGTCT TTCGGGTATT GTGCTTTTTA TATTATATTG TTTTGTATCC GTAATAAAG 1260
TGGTGTGTAA GAATAAGATA TTTGACATAT ATTATTTTCA AAAAAAAAAA AAAAAA 1316

FIG. 2C



AGCAGTCGCA ATTCGATTGT CCTGCATATG AATGGAGCTC CAAGAAGTCC TGCATATGAA TGAAGTGAA GCGGATACAA GCTACGCCAA 90
GAATGCATCC TACAATCTGG CTCCTTGCAA GGTGAACCT TTCTTGAAC AATGCATACG AGAATTGTTG CCGGCCAACT TGCCCAACAT 180
CAACAAGTGC ATTAAGTTG CGGATTTGGG ATGCGCTTCT GGACCAACA CACTTTTAAC AGTGGGGAC ATTGTGCAA GTATTGACAA 270
AGTTGGCCAG GAAGAGAAGA ATGAATTAGA ACGTCCACC ATTCAGATT TTCTGAATGA TCCTTTCCAA AATGATTTCA ATTGCTTTT 360
CAAGTTGCTG CCAAGCTTCT ACCGCAACT AGGAGTCCAT GCATTTTGTG GAGTATTTAC TCTTCCAAAG CAGGTTCCCA CTGGCTCTTT 450
CTACGGCAGA CTCTTCCCG GGGATTGGTG CAAACAAAGG GAGTATTTAC TCTTCCAAAG CAGGTTCCCA AAGGCATATT TGGATCAATT 540
GATTGAATTG GGGATTGGTG CAAACAAAGG GAGTATTTAC TCTTCCAAAG CAGGTTCCCA AAGGCATATT TGGATCAATT 630
TACGAAAGAT TTACCCACAT TTCTAAGGAT CCCTAGACTT TTACACCTTC AGCAGAAGAA GTAAAGTGCA TAGTTGAGGA AAAAAATTGA 720
TGAATTCGAC GAACCGAATC CCCTAGACTT TTACACCTTC AGCAGAAGAA GTAAAGTGCA TAGTTGAGGA AAAAAATTGA 810
TAGTTTCAAT ATTCCATTCT TTACACCTTC AGCAGAAGAA GTAAAGTGCA TAGTTGAGGA AAAAAATTGA 900
GACTTTTAAG GCCATTATG ATGCTGCCTT CTCTATTGAT CTCTATTGAT GATGATTACC CAGTAAGATC GCATGAACAA ATTAAAGCAG AGTATGTGGC 990
ATCATTAAAT AGATCAGTTT ACGAACCCTT CCTCGCAAGT CATTITGGAG AAGCTATTAT GCCTGACTTA TTCCACAGGC TTGCGAAGCA 1080
TGCAGCAAAG GTTCTCCACA TGGGCAAGG CTGCTATAAT AATCTTATCA TTTCTCTCGC CAAAAAGCCA GAGAAGTCAG ACGTGTAAA 1170
GTTTGTTTT AGTTGGTTT TGTGCCGTTG GGGTCTTTC GGGTATTGTC GTTTTGATT CGTAATAAAA GTGATGTGCA AGAATAAGAT 1260
ATTAGTACA ATATTTTCAT AAAAAAAA AAAAAA

FIG. 2D

FIG. 3



FIG. 4

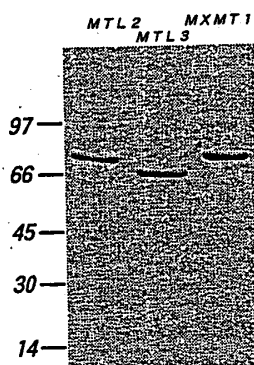




FIG. 5

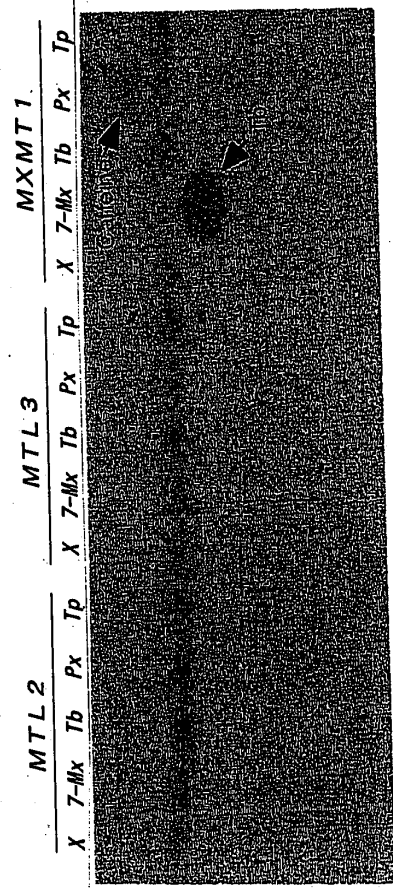




FIG. 6

